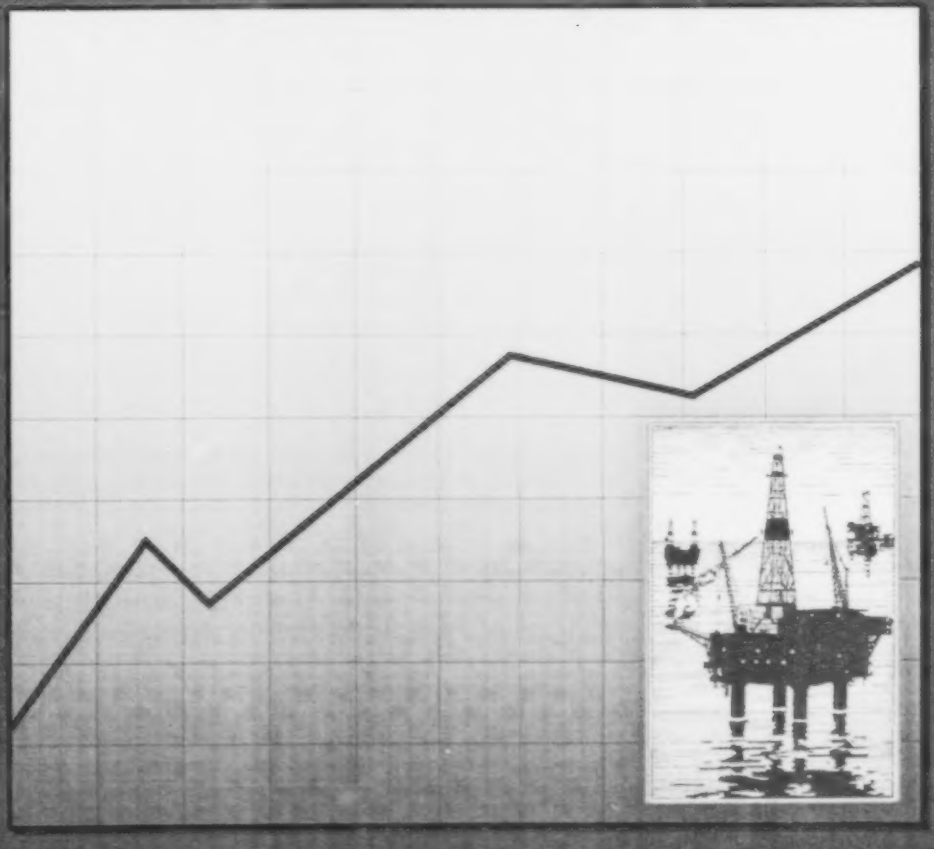
Productivity and Productivity Growth: Newfoundland and Labrador



GOVERNMENT OF
NEWFOUNDLAND AND LABRADOR

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Productivity and Productivity Growth: Newfoundland and Labrador

Prepared for the Strategic Partnership Forum

Prepared by
Economic Research and Analysis Division
Economics and Statistics Branch
Department of Finance

Comments or questions regarding this report should be directed to:
Rose AuCoin
Senior Economist
729-0856
e-mail: raucoin@gov.nf.ca

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EXECUTIVE SUMMARY

Productivity and productivity growth are of interest for a number of reasons. Improvements in living standards and increases in competitiveness can be achieved through productivity gains.

At the national level, productivity issues have become more prominent, given a widening productivity gap between Canada and the U.S. In terms of real output per hour worked, for example, Canadian labour productivity was about 81% of the U.S. level in 2001, down from almost 90% in the mid 1980s.

At the provincial level, the Strategic Partnership Forum has identified productivity in Newfoundland and Labrador as an issue which should be explored.

Productivity analysis is usually conducted using two measures: labour productivity and total factor productivity (TFP). Labour productivity is the quantity of goods and services produced per unit of labour input. The quantity of goods and services produced is typically measured using real (adjusted for inflation) Gross Domestic Product (GDP). The level of total factor productivity (alternatively called multi-factor productivity) is difficult to capture because of the different units of measure of inputs, however, it is theoretically the amount of output produced per unit of combined labour and capital. Gains in output that cannot be attributed to increases in the quantities of labour and/or capital used are known as TFP growth.

There have been several analyses of productivity in Newfoundland and Labrador. The analyses all found that the province was lagging in terms of productivity and productivity growth compared to most other provinces and the national average.

The most recent provincial productivity analysis available was conducted by the Centre for the Study of Living Standards (CSLS) and made available on their website. This analysis shows that Newfoundland and Labrador is still lagging the national average in terms of both labour and total factor productivity growth and is also lagging the Atlantic average in terms of total factor productivity growth. However, the province has exceeded the Atlantic average for labour productivity growth. In 1989, Newfoundland and Labrador's labour productivity was 86.2% of the national level and 102.8% of the Atlantic level. By 2001, the province's labour productivity had fallen to 83.5% of the national level, however, it had grown to 105.2% of the Atlantic level.

The analysis also reveals, however, that gains in productivity relative to other provinces have been made in the last five years as a result of the emergence of the oil industry and furthermore, that short to medium term prospects for productivity gains are very good as the oil industry continues to expand and the Voisey's Bay mining project comes on stream.

INTRODUCTION

A region's standard of living, typically, defined as real GDP per capita, can be impacted by a number of factors including: changes in the employment/population ratio, changes in terms of trade and/or changes in productivity. While improvements in either of these factors will result in a higher standard of living, the employment/population ratio and, to a lesser extent, terms of trade have upper limits and therefore can impact living standards only in the short term. In the long run, the only sustained manner to increase per capita GDP is by increasing the amount of output produced per worker, that is by raising labour productivity. Higher levels of output relative to labour input generally translate into higher returns for the factors of production (i.e., labour & capital). Thus productivity gains generally go hand in hand with real wage rate gains and improving living standards.

While an improvement in living standards is the most well-known benefit of productivity gains, productivity growth can provide other benefits to an economy as well. More competitive businesses and higher employment levels can result from increasing productivity.

At the individual firm level, productivity gains relative to it competitors will enhance a firm's competitive position allowing it to increase profit margins or sell products cheaper. Lower prices relative to its competitors would allow it to expand production and gain market share. For firms producing products sold in highly competitive markets, productivity gains are often crucial just to survive. Firms are all striving to obtain a competitive edge and those firms that do not pursue productivity gains are unlikely to survive in the long run. In this province, for example the local iron ore and newsprint industries have invested substantially in their operations over the past 20 to 30 years just to remain competitive. In tandem with this, there has been significant productivity gains and job reductions in these industries. This was necessary for these industries to remain viable in the long run. Otherwise, some of the firms in these industries might not be in operation today.

Another potential benefit of increasing productivity is expanding economic activity and employment growth. If a company, industry or region has higher rates of productivity growth relative to other competitors, it is likely that the region has or will develop a competitive advantage over time. Such a competitive advantage will likely attract new investment as firms expand output to exploit the advantage.

Productivity, as a public policy issue, has become more prominent in recent years, heightened by the increasing productivity gap between the US and Canada. When measured in terms of real GDP per hour worked, for example, the Canadian Centre for the Study of Living Standards (CSLS) reported that, in 2001, Canadian labour productivity was about 81% of the U.S. level, down from almost 90% in the mid 1980s.

The purpose of this report is to define productivity and to present the findings of several studies on productivity in Newfoundland and Labrador. Specifically, this report will discuss the measurement of labour productivity and total factor productivity (TFP); briefly review reports by the Economic

Council of Canada and the Advisory Council on the Economy and; discuss in more detail a recent study by the Canadian Centre for Living Standards.

PRODUCTIVITY DEFINITION AND MEASUREMENT

Simply defined, productivity is output per unit of input. Labour productivity is output per unit of labour input while total factor productivity (TFP) is output per unit of labour and capital (combined) input.

Productivity growth is the change in the ratio of output to input(s) over time. If more output is produced per unit of input(s) in one period compared to another then productivity has increased. Conversely, if output per unit of input(s) has fallen, then productivity has declined.

Labour Productivity

Labour productivity is the most widely used measure of productivity. It is generally calculated using real GDP as the measure of output and number of workers or hours worked as the measure of labour input. Labour productivity depends on a number of factors, including the use of technology and the quantities of other inputs (i.e. capital) used in the production process. In the past, gains in labour productivity have occurred in tandem with gains in living standards.

Total Factor Productivity

Total factor productivity (TFP), on the other hand, is a ratio of the amount of output produced to both labour and capital inputs. TFP is the relevant productivity measure for those interested in how efficiently all factors of production are utilized since it takes into account the contribution of both labour and capital to output gains. Gains in output that cannot be attributed to increases in labour and/or capital used are known as TFP growth. It is incorrect to say that TFP is a superior or preferred measure of productivity compared to labour productivity, as the two concepts serve different purposes. Gains in TFP can be due to a number of factors including worker training, technology advances, management practices, economies of scales, etc.

Productivity challenges

Measuring and analyzing productivity is a complex and challenging issue for a range of reasons:

- Measuring output is complex, particularly in the services sector. Most analyses of productivity use real GDP as the measure of output. In the service sector, GDP is highly correlated with wages. Consequently, productivity in the services sector (which is generally not capital intensive) is highly correlated with wages, and those services industries or provinces paying higher wages will, in most cases, have higher measured productivity levels.

- It is difficult to measure changes in the quality of inputs - labour and capital - since they are not homogenous (constant) over time. Labour force training may result in a better quality of labour inputs, and new capital investments may use more advanced technology than was available in prior years.

- Comparing levels of productivity across provinces is difficult because of different industrial structures, and since output is measured in value terms, productivity will be affected by price and wage differentials. Consequently, caution should be exercised when making cross-jurisdictional productivity comparisons. As well, comparisons of productivity levels across industries is often not appropriate because of the different labour/capital mixes. Moreover, even within industries, it is sometimes difficult to compare productivity levels. For example, a crab plant would have different inputs and outputs than a groundfish plant, and a sawmill producing rough lumber would be different from a plywood-producing operation.

- Productivity growth is subject to lag effects in production and business cycles. Therefore, there is often short term volatility in productivity. Productivity analysis should be conducted using long term comparisons in tandem with the business cycle, preferably on a peak-to-peak basis.

- Data quality may be suspect, particularly at finer levels of detail (e.g., industries). For example: (i) labour inputs are generally calculated from the Labour Force Survey which is a sample survey subject to relatively large degrees of volatility and measurement errors at detailed levels and (ii) uncertainty about proper capital depreciation rates for some capital inputs makes it difficult to estimate capital stock accurately.

PROVINCIAL STUDIES OF PRODUCTIVITY

There have been three analyses of productivity in Newfoundland and Labrador, including a review of the factors which impact on productivity. Two of these studies were completed by the Economic Council of Canada (ECC) (*Living Together*, 1977 and *Newfoundland: From Dependence to Self-Reliance*, 1980) and one by the provincial Advisory Council on the Economy (ACE) (*Productivity and Economic Growth*, 1991). Most studies have shown that Newfoundland and Labrador has lagged in terms of both productivity levels and productivity growth.

The ECC report, *Newfoundland: From Dependence to Self-Reliance*, included a chapter entitled Productivity and Industry Performance which outlines the results of a study, conducted by the ECC with the assistance of Statistics Canada, on productivity from the perspective of the establishment. The study found that in some industrial sectors in the province productivity levels were on par with or greater than that of Ontario. The ECC reviewed nine sectors producing similar goods and services in Newfoundland and Ontario (one sector, fish processing, used Nova Scotia for comparison). These sectors were: nonresidential building contractors; retail grocery stores; department stores; bakeries; fresh and frozen fish processors; insurance agents and brokers; full-service hotels; confectionary wholesalers; and local trucking. In four of these industries—department stores, bakeries, hotels, and

confectionary wholesalers—productivity levels in Newfoundland were not significantly different from that in Ontario. This lends support to the principle of comparing similar sectors when doing productivity analyses.

The ECC report identified several interdependent factors impacting productivity and performance in Newfoundland and Labrador. These factors include agglomeration economies, organizational structure, technology, the quality of labour and management, seasonality and government policies.

The ACE work (1991) is the most recent and, for the most part, broadened the scope and updated the ECC reports (1977 and 1980). This study included detailed productivity work, comparing Newfoundland and Labrador to other provinces and to other countries for both labour and total factor productivity. Most indicators and most of the analysis found that the province was below other jurisdictions in terms of productivity levels and productivity growth.

The ACE study identified six broad issues in 1991 which they felt were impacting on the ability of policy makers to positively influence productivity growth in the province:

- The industrial structure is concentrated toward low productivity industries;
- There is a high degree of seasonality in the employment of labour and capital;
- Economies of scale are limited due to a small population and high population dispersion, distance to major markets, industrial structure and lack of firm "clustering";
- Capital formation is relatively low and technological change is slow (this issue included R&D, the diffusion of advanced technologies, and investment in capital stock);
- Differences in the level of education and labour market training; and
- Management practices and management-labour relations.

The ACE study also included an interview process with 23 firms, business associations and unions. Five themes emerged from these interviews:

- There is a need for industrial re-structuring and to reduce seasonality;
- More focus must be placed on capital investment and technological change;
- Education and labour market training are paramount;
- Tax policy and the regulatory environment must be addressed; and
- A consensus must be built among labour, business and governments.

The study concluded with six recommendations which outlined specific actions to improve provincial productivity performance. The recommendations covered the following issues:

- Better allocate resources to facilitate industrial restructuring, remove trade barriers and barriers to structural change and target export markets;
- Increase the emphasis placed on education and training;
- Better complement public sector infrastructure investments with private sector investment, promote adoption of new technologies and R&D, and introduce tax reforms to improve the competitive position of firms

- Promote better labour-management relations (e.g., information sessions, workshops, training).

In the years following the release of the ACE report, government has entered into several agreements and commenced several initiatives which are consistent with the recommendations of the ACE study.[1] These include, for example, signing onto the Agreement on Internal Trade (1994) which reduced and removed interprovincial trade barriers, the EDGE program (1995) which uses tax policy instruments to attract investment, and increased emphasis on research and development through the construction of new facilities (e.g., expansion of the Marine Institute).

RECENT DATA ON PRODUCTIVITY

More recently (2000), the Atlantic Canada Opportunities Agency contracted the Centre for the Study of Living Standards (CSLS) to compile industry level productivity data for the Atlantic provinces, and to examine manufacturing in detail.[2] The report, *The Canada-Atlantic Canada Productivity Gap: A Detailed Analysis,* compared labour, capital and total factor productivity in Atlantic Canada to the national level. Estimates of productivity growth were calculated for three periods over the years 1984 to 1998. The main findings of this work are that a gap exists in manufacturing productivity in Atlantic Canada and that this gap is the result of less innovation (particularly in high tech sectors), lower economies of scale, more seasonality, and lower educational attainment. The CSLS work, however, does not comprehensively assess the underlying reasons and trends which affect productivity for all industries, and offers only general policy suggestions on how productivity performance can be improved. While results for just Canada and the Atlantic provinces are published in the report, comparable information for the other provinces is available on the CSLS website.

More recent work completed by the CSLS (available on their website) compared labour, capital and TFP for Canada and the provinces for the period 1987-2001. A short analysis of the more recent CSLS work is provided below. While the information provided by the CSLS through their website provides data for the period 1987 to 2001 and presents growth rates for several time periods throughout these years, the following analysis concentrates on the period 1989-2001. These endpoints are chosen because they represent peak business cycle years and, as stated earlier, current thinking suggests that peak-to-peak is the most appropriate way to analyze productivity growth.

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[1] It is difficult to determine a cause and effect relationship between the ACE recommendations and government policy in subsequent years. In many cases, however, government policy was consistent with the approach recommended by the ACE report.

[2] The Centre for the Study of Living Standards, established in 1985, serves as an interface between the academic community and public policy makers. It develops research networks on issues affecting living standards high on policy agenda. The Centre is based in Ottawa.

Labour Productivity

The level of labour productivity (all industries) in Newfoundland and Labrador— real GDP per hour worked—was just over $30 in 2001. This translates to about 83.6% of the national average and 105.2% of the Atlantic average. While gains have been made relative to the Atlantic average since 1989 (Newfoundland and Labrador was at 102.8% in 1989) the province has lost ground relative to the national average. In 1989, labour productivity in the province was 86.2% of the national average.

Figure 1

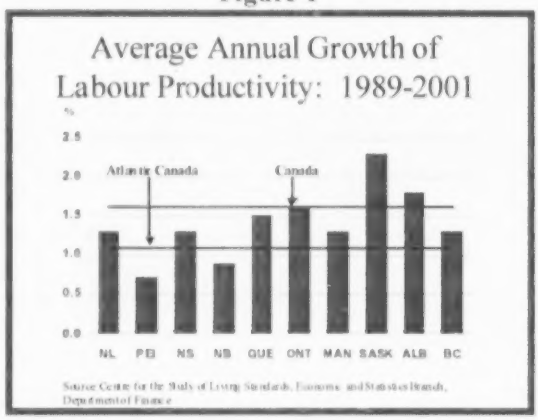


Figure 1 shows labour productivity growth by province for 1989 to 2001. This period should be representative of long-term trends in labour productivity. Growth in Newfoundland and Labrador averaged 1.3% over this period, equal to that recorded for Nova Scotia but well above that recorded for the other two Atlantic provinces. Canada's labour productivity growth over the 1989 to 2001 period was slightly higher at 1.6%.

Though short-term, it is noteworthy to mention that significant gains in labour productivity have been made in Newfoundland and Labrador in the past five years. From 1997 to 2001, labour productivity growth in the province averaged 1.9% per year. This was 0.7 percentage points higher than the Atlantic average and 0.4 points higher than the national average. The performance of the province over the 1997 to 2001 period was due, in large part, to the changing industrial structure of the province's economy over the period, with the commencement of oil production in 1997 and the ramping up of output in subsequent years. Real GDP directly attributable to oil extraction went from $22.4 million (constant 1997$) to $969 million between 1997 and 2001.

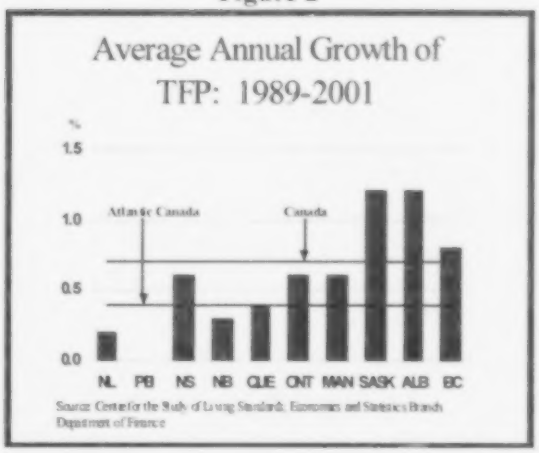
If oil production were excluded from productivity measures, productivity growth estimates for the economy would be significantly lower in recent years. Excluding oil, labour productivity in the province is estimated to have declined by 0.2% per year between 1997 and 2001. This drop in labour productivity is likely due to the fact that much of the employment growth throughout this period was in the service sector where output per hour worked is below the average for the economy.

While estimates of productivity and productivity growth can be calculated by industry, it is difficult to draw conclusions about productivity trends at the industry level because of problems with data availability and, more particularly, data quality at disaggregated industry levels.

Total Factor Productivity

Figure 2 presents total factor productivity growth rates by province from 1989 to 2001. Newfoundland and Labrador's average annual growth rate was 0.2%. This was below the Atlantic average rate of 0.4% and significantly below the Canadian rate of 0.7%. Newfoundland and Labrador's TFP growth was lower than labour productivity growth over the 1989 to 2001 period, in keeping with the general experience of TFP and labour productivity gains. Generally, TFP growth is slower than labour productivity growth as capital typically increases at a faster rate than labour.

Figure 2



Similar to labour productivity, provincial TFP made significant gains during the past five years as a result of oil industry growth. From 1997 to 2001, TFP growth was 2.0% compared to the Canadian and Atlantic averages of 1.1%. TFP growth over this period stemmed largely from the oil industry. Excluding oil, TFP growth is estimated to have been 0.4% per year since 1997.

SUGGESTIONS FOR FUTURE STUDY

A better understanding of the productivity differentials between Newfoundland and Labrador and other areas of Canada could be achieved by studying individual firms within comparable industries. The data should be collected at the individual firm level to ensure reasonable comparisons are being made. This could be accomplished through a new study replicating the 1980 ECC study.

Other areas of study which could improve the industry level productivity estimates include finding more reliable estimates for labour inputs and more tangible measures of real output (i.e. tonnes of newsprint instead of GDP for newsprint).

REFERENCES

Advisory Council on the Economy, *Productivity and Economic Growth: Prospects and Policies for Newfoundland and Labrador*, December 1991.

Baldwin, John R. et al, *Productivity Growth in Canada*, Statistics Canada, catalogue No. 15-204-XPE, January 2001.

Canadian Chamber of Commerce, *The Challenge: Ensuring Competitiveness and Future Economic Prosperity*, April 2000.

Centre for the Study of Living Standards, *The Canada-Atlantic Canada Productivity Gap: A Detailed Analysis*, July 2000.

Economic Council of Canada, *Newfoundland: From Dependence to Self-Reliance*, 1980.

Economic Council of Canada, *Living Together*, 1977.

Institute for Research on Public Policy and Centre for the Study of Living Standards, *The Review of Economic Performance and Social Progress, Towards a Social Understanding of Productivity*, 2000.

Sharpe, Andrew, *What do the Canada-US Productivity Numbers Mean?*, published in Policy Options, May 1999.

Statistics Canada, *Differences in Interprovincial Productivity Levels*, December 2001.

APPENDIX I

Understanding Productivity:
A presentation for the Strategic Partnership Forum

July 23, 2002

Understanding Productivity

A presentation for the Strategic Partnership Forum

Departments of Finance and Industry, Trade and Technology

Dr. Doug May, Rod Regier, Ken Hicks and Gerald Crane

July 23, 2002

Purpose of Discussion

- How are productivity and competitiveness different?
- Explain productivity measures
- Show productivity trends
- Identify key issue – perception that provincial industries are less productive

Productivity and Competitiveness

- Productivity
  - A measure of how efficiently a firm, sector or economy transforms the services from labour, capital and other resources into goods and services
- Competitiveness
  - Ability of a firm, sector or economy to produce at lower costs than competitors
- Productivity is a key determinant of competitiveness

Why is productivity important?

- Productivity growth means increased output per units of inputs (factors of production)
- Productivity growth closely correlated to
  - Growth in real wages
  - Improvement in standard of living
- All industrialized countries measure productivity
- Economic agencies in Canada that study productivity, e.g.
  - Statistics Canada
  - Industry Canada
  - Centre for the Study of Living Standards

Provincial Studies of Productivity

- Economic Council of Canada
  - 1977 – Living Together
  - 1980 – Newfoundland: From Dependence to Self-Reliance
- First major studies of productivity for the province
- Major findings
  - Low productivity relative to other provinces
  - Major influence for low levels of earned income per capita
  - Factors included education levels, slow adoption of technology, and lower rates of urbanization
  - 3 recommendations in 1980 report (training and monitoring)

Provincial Studies of Productivity

- Last major study completed in 1991
  - Advisory Council on the Economy
  - Input to 1992 Strategic Economic Plan
  - Data analysis and 23 firm and union level interviews
  - 6 recommendations
- Major findings
  - Productivity growth (1975-1989) relatively low compared to other provinces – economic divergence
  - Major factors: industrial structure, seasonality, agglomeration, training, capital formation, and management practices
  - Productivity improvement would require major investment in human capital, and physical plant and equipment

How is Productivity Measured?

- Productivity must be viewed on a long term basis
- Measure productivity level and productivity growth
- Two measures
  - Labour productivity
  - Total factor productivity (TFP)

Labour Productivity

- Most commonly quoted measure
- Simple to understand
- Definition: Output / Labour
- Labour measured in terms of:
  - Hours worked
  - Persons employed
- Data available by industry across jurisdictions

Weakness of Labour Productivity

- Does not consider
  - Capital stock and investment
  - Quality of labour (training)
  - Economies of scale
  - Other services

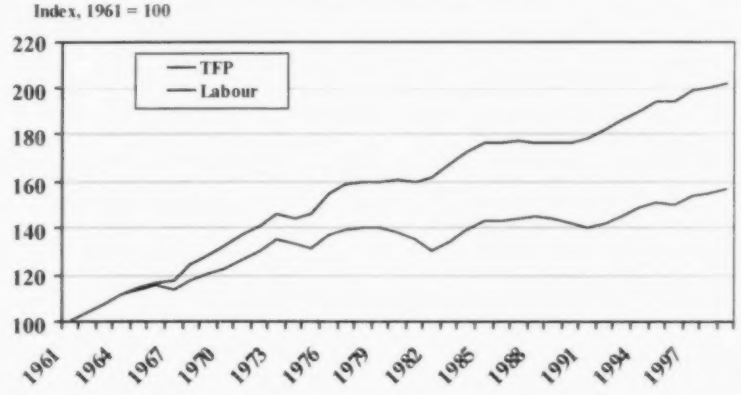
  Therefore – overemphasizes the role of labour

- Additional issues identified later
  - Common issues with Total Factor Productivity

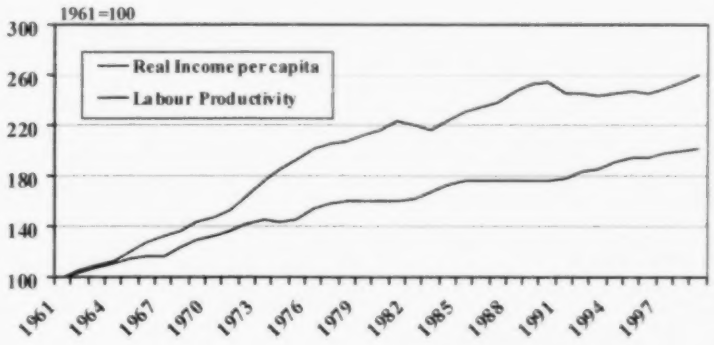
Total Factor Productivity

- Considers contribution of labour and capital services to output
- Output normally measured to a real value-added basis
- More complex measure
- Growth in TFP refers to change in output relative to the change in the bundle of inputs
- Key challenges
  - Measuring capital stock
  - Measuring output in services industries

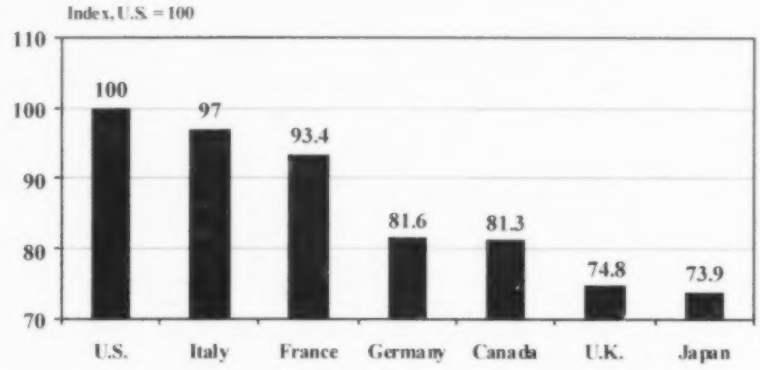
Cumulative Labour and TFP Growth in the Business Sector Canada 1961 to 1999



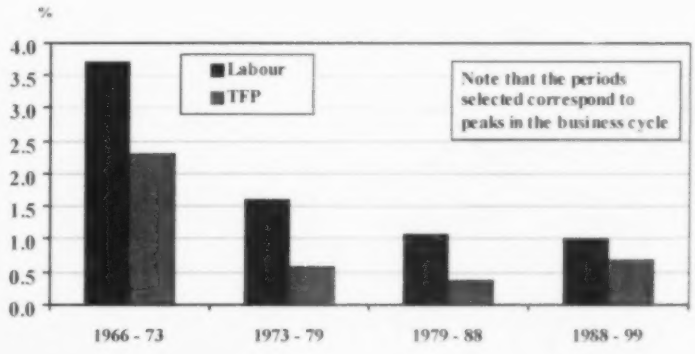
Cumulative Labour Productivity and Real per Capita Income Growth in the Business Sector Canada 1961 to 1999



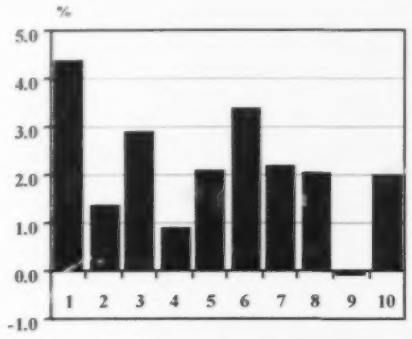
Productivity Levels, G-7 Nations
Total Economy, 1997



TFP and Labour Productivity
Average Growth Rates, Selected Periods
Canada

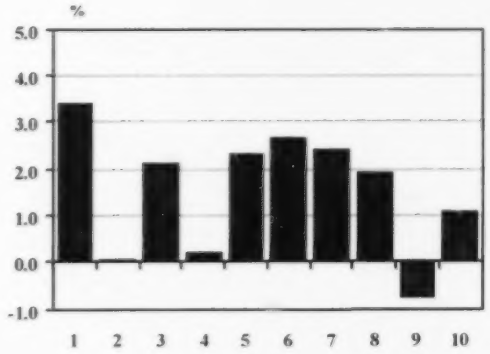


Labour Productivity by Industry
Average Annual Growth, 1961 - 1999
Canada



1 - Agricultural & Related Services
2 - Other Primary
3 - Manufacturing
4 - Construction
5 - Transportation & Storage
6 - Communication & Other Utility
7 - Wholesale Trade
8 - Retail Trade
9 - All Other Services
10 - Business Sector

TFP by Industry
Average Annual Growth, 1961 - 1999
Canada



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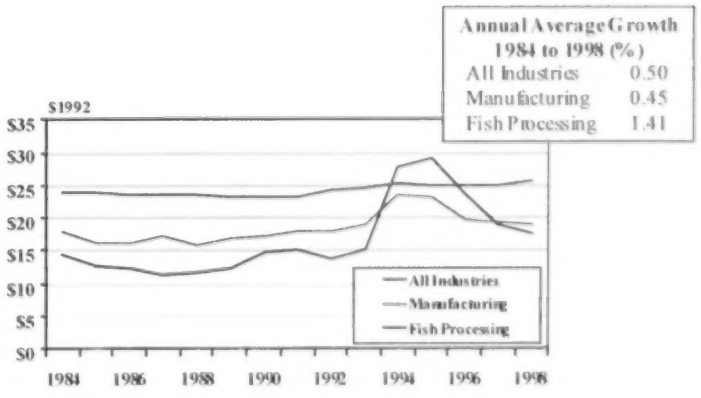
Value Added per Hour
Percent of Canadian average, 1998

	Atlantic	Nfld & Lab	Nova Scotia	P.E.I.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	Brit. Col.
Agriculture	88.7	**98.5**	87.0	87.6	89.8	97.6	**95.3**	80.0	91.0	120.5	125.7
Fishing & Trapping	79.1	**74.2**	92.6	59.2	76.2	109.9	**n/a**	34.9	n/a	**n/a**	192.7
Logging & Forestry	59.6	**45.9**	26.3	n/a	87.5	74.2	**87.5**	59.4	201.0	130.2	139.6
Mining Quarries & Oil Wells	62.4	**102.9**	26.5	n/a	59.9	46.3	**64.0**	59.5	139.5	119.6	96.3
Manufacturing	74.0	**64.0**	77.0	99.8	71.4	88.0	**114.2**	87.1	78.1	110.8	74.5
Construction	83.3	**120.9**	83.6	65.5	66.7	123.1	**80.9**	93.1	118.4	123.2	100.1
Transportation & Storage	83.7	**85.7**	78.3	114.7	83.8	87.5	**91.1**	100.9	142.8	120.6	116.0
Communication & Other Utilities	102.5	**118.5**	102.7	159.6	89.9	107.4	**94.8**	110.8	103.6	102.8	92.5
Wholesale Trade	77.0	**71.5**	75.1	80.9	81.4	92.4	**111.2**	84.9	94.6	106.3	89.0
Retail Trade	86.7	**89.3**	85.5	85.4	86.7	99.5	**102.1**	92.8	101.4	**104.4**	98.2
Finance and Insurance	87.6	**152.1**	75.5	135.7	79.8	92.1	**100.9**	79.8	85.8	123.0	109.4
Real Estate and Insurance	95.9	**86.4**	92.0	124.6	104.2	106.5	**96.2**	106.7	109.8	111.9	87.9
Business Services	82.8	**101.0**	72.7	61.1	91.9	91.1	**107.0**	76.1	110.6	**108.7**	91.8
Government Services	106.9	**101.7**	118.7	88.7	100.7	90.3	**99.9**	106.0	87.7	105.4	96.6
Educational Services	87.0	**90.7**	89.2	95.5	79.8	102.8	**102.8**	81.6	75.1	**90.3**	112.4
Health and Social Services	83.1	**81.8**	83.6	87.2	82.7	104.5	**104.2**	95.2	86.3	**89.9**	101.3
Accomm., Food & Beverage	82.4	**81.2**	84.5	80.1	80.8	90.4	**97.8**	100.2	95.3	112.5	114.0
Other Service Industries	70.1	**78.8**	64.9	86.2	68.3	95.6	**107.3**	89.2	79.7	104.4	104.7
Total Economy	**83.7**	**90.5**	**82.5**	**80.6**	**81.6**	**92.8**	**103.3**	**89.3**	**95.8**	**114.8**	**99.6**

Output Per Hour of Labour Input
Newfoundland ($1992)



Issues in Measuring Productivity

- Short term volatility
  - Best analysis – long term business cycle comparisons
  - Less reliable – short term or arbitrarily selected endpoints for analysis
  - Lag effects – production and business cycles
- Assumptions needed to relate productivity growth to technological change
- Accounting for qualitative changes in labour and capital over time
- Data quality – sampling estimates for labour
- Services sector output a function of wages

Key Issue

- Perception is that provincial industries are less productive
- Questions to be addressed:
  - Are they, in fact, lower?
  - How do compositional differences impact the measures?
  - What are the possible factors behind lower productivity measures?
    - Economies of scale (e.g., more seasonality)
    - Wages

Initiatives

- Department of Finance to study manufacturing industry performance
  - Labour productivity is one indicator
- Increase research and intelligence efforts
  - Industry focus groups
  - Develop more and better data over time
  - Focus on understanding factors behind quality of inputs
  - Identify factors that influence productivity (e.g., management practices)